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(72) Inventors RONALD STANSFIELD GOY and JOHN ALEXANDER JENKINS

(54) RACQUET STRINGS MADE OF FIBRILLAR MATERIAL

(71) We, DUNLOP HOLDINGS LIMITED, formerly The Dunlop Company Limited, a British Company of Dunlop House, Ryder Street, St. James's, London, S.W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to strings for tennis and other racquets made of fibrillar materials, and particularly to racquet strings comprising fibrillar thermoplastic material.

When a thermoplastic material is oriented, for instance by stretching or drawing, so that the molecules thereof become oriented substantially parallel to the direction of stretching, the material at this stage is fibrillatable (alternately referred to herein as "oriented material"). If the fibrillatable material is subsequently subjected to stress, it develops a number of filament-like fibrils and may have the appearance of a strip formed from a number of continuous filaments in substantially parallel and side-by-side relationship, or of a yarn or thread formed from twisted continuous filaments, and becomes "fibrillated material". Suitable fibrillar thermoplastic materials are, for instance, polypropylene (especially isotactic polypropylene), ep sulphide polymers, polyamides and polyesters such as polyethylene terephthalate.

The present invention provides a string for a tennis or other racquet comprising a core of fibrillated thermoplastic material wrapped with one or more wrappings of thermoplastic material.

The fibrillated thermoplastic material of the core may conveniently be in the twisted form. Thus, a suitable core may be produced by twisting a tape of the fibrillatable thermoplastic material and hot-stretching the twisted tape to consolidate the structure. Alternatively, the fibrillated material may be in the untwisted form and the substantially cylindrical form of the string maintained by the wrapping layers.

The wrapping layers in a racquet string of the present invention may be continuous filaments, as in conventional strings for tennis racquets. For instance, the wrappings may comprise a synthetic polymer textile monofilament and/or a synthetic polymer textile yarn. The preferred synthetic polymer is nylon. A fibrillated thermoplastic material in twisted or untwisted form or a film or tape of oriented thermoplastic material which has not been fibrillated are also suitable materials for the wrappings.

The preferred fibrillated thermoplastic material for use in the racquet strings of the present invention is fibrillated polypropylene.

In making a racquet strings of the present invention, the first wrapping is conveniently wrapped round the core at an angle of about 20° to 30° to the core axis. If further wrappings are applied, they may be wrapped at similar angles to the core axis in the same direction as the first one or in the opposite direction. The whole assembly may be bonded together by means of resins such as epoxy or nylon resins.

The invention is illustrated in the following Examples:—

EXAMPLE 1

A polypropylene tape, $\frac{1}{4}$ inch wide, 0.004 inches thick and having a denier of approximately 3400, was twisted 2 turns per inch. The resulting twisted material was hot-stretched to consolidate the structure and the resulting fibrillated material used as the core of a racquet string. The core was wrapped with one layer of fourteen 210 denier nylon yarns at an angle to the core axis of approximately 27°. A second layer of 20 ends of 0.006 inch diameter nylon 6 monofil was wrapped on top of the first layer at an angle to the core axis of approximately 21° in the opposite direction to the first layer. The assembly was bonded with an epoxy resin and the product was a string suitable for use in tennis and similar racquets.

EXAMPLE 2

A core of fibrillated polypropylene was prepared as in Example 1 and wrapped with a flat polypropylene tape 0.075 inch wide and 0.004 inch thick at an angle to the core axis of approximately 26°. A second flat polypropylene tape was then wound on top of the first at an angle of 31° to the core axis in the opposite direction. The assembly was bonded with a nylon resin and the product was a string suitable for use in tennis and similar racquets.

EXAMPLE 3

A core of fibrillated polypropylene was prepared as in Example 1. The wrapping material was prepared from a polypropylene tape 0.075 inch wide and 0.0025 inch thick, which was twisted 5 turns per inch and hot-stretched to consolidate the structure. Five of these twisted fibrillated tapes were then wound around the core at an angle to the core axis of 24½° and the assembly bonded with an epoxy resin. The product was again a string suitable for use in tennis and similar racquets.

material wrapped with one or more wrappings of thermoplastic material.

2. A string according to Claim 1, in which the wrapping comprises a synthetic polymer textile monofilament.

3. A string according to Claim 1 or 2, in which the wrapping comprises a synthetic polymer textile yarn.

4. A string according to Claim 2 or 3, in which the synthetic polymer textile is nylon.

5. A string according to Claim 1, in which the wrapping comprises a film or tape of oriented thermoplastic material.

6. A string according to Claim 1, in which the wrapping comprises fibrillated thermoplastic material.

7. A string according to any one of the preceding claims, in which the fibrillated thermoplastic material is fibrillated polypropylene.

8. A string for a tennis or other racquet, substantially as described in any one of the Examples.

9. A string according to Claim 1, substantially as described herein.

WHAT WE CLAIM IS:—

1. A string for a tennis or other racquet, comprising a core of fibrillated thermoplastic

R. I. G. McKAY,
Agent for the Applicants.

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